CLAIMS

1. A method for intradermal or transdermal delivery of an oligonucleotide or polynucleotide comprising:
   (a) generating at least one micro-channel in an area of the skin of a subject; and
   (b) applying to the area of the skin of the subject where the at least one micro-cannel is present a pharmaceutical composition comprising as an active ingredient a therapeutically effective amount of an oligonucleotide or polynucleotide and a pharmaceutically acceptable carrier.

2. The method according to claim 1, further comprising generating a plurality of micro-channels in said area of the skin of said subject, thereby facilitating the intradermal or transdermal delivery of the oligonucleotide or polynucleotide.

3. The method according to claim 1, wherein the oligonucleotide or polynucleotide is selected from the group consisting of oligonucleotides or polynucleotides of DNA, RNA, and synthetic analogs thereof.

4. The method according to claim 3, wherein the oligonucleotide or polynucleotide encodes a polypeptide, an analog, fragment, or fusion protein thereof.

5. The method according to claim 3, wherein the oligonucleotide or polynucleotide is operably linked to regulatory sequences, thereby capable of being expressed in cells of the subject.

6. The method according to claim 4, wherein the polypeptide is selected from the group consisting of insulin, proinsulin, follicle stimulating hormone, insulin like growth factor-1, insulin like growth factor-2, platelet derived growth factor, epidermal growth factor, fibroblast growth factors, nerve growth factor, colony stimulating factors, transforming growth factors, tumor necrosis factor, calcitonin, parathyroid hormone, growth hormone, bone morphogenic protein, erythropoietin, hemopoietic growth factors, luteinizing hormone, glucagon, glucagon like peptide-1, clotting factors, anti-clotting factors, atrial natriuretic factor, plasminogen

activators, bombesin, thrombin, enkephalinase, vascular endothelial growth factor, anti-angiogenic factors, interleukins, viral antigens, non-viral antigens, transport proteins, and antibodies.

7. The method according to claim 3, wherein the oligonucleotide is selected from the group consisting of antisense oligonucleotides, small interfering oligonucleotides (siRNAs), and miRNAs.

8. The method according to claim 1, wherein the pharmaceutical composition further comprising at least one additive selected from the group consisting of lipids, polycations, and nuclease inhibitors.

9. The method according to claim 1, wherein generating the at least one micro-channel in the area of the skin of the subject is conducted with an apparatus comprising:

(a) an electrode cartridge comprising a plurality of electrodes; and

(b) a main unit comprising a control unit which is adapted to apply electrical energy between two or more electrodes when the electrodes are in vicinity of the skin, typically generating current flow or one or more sparks, enabling ablation of stratum corneum in an area beneath said electrodes, thereby generating at least one micro-channel.

10. The method according to claim 9, wherein the electrode cartridge is adapted to generate a plurality of micro-channels of uniform shape and dimensions.

11. The method according to claim 9, wherein the electrodes have a diameter in a range of 30 to 150 microns.

12. The method according to claim 11, wherein the electrodes have a diameter in a range of 40 to 100 microns.

13. The method according to claim 9, wherein the electrodes have a length in a range of 30 to 500 microns.

14. The method according to claim 13, wherein the electrodes have a length in a range of 50 to 100 microns.

15. The method according to claim 9, wherein the electrical energy is of radio frequency.

16. A method for intradermal or transdermal delivery of an oligonucleotide or polynucleotide comprising:

(a) applying to an area of the skin of a subject a pharmaceutical composition comprising as an active ingredient a therapeutically effective amount of an oligonucleotide or polynucleotide and a pharmaceutically acceptable carrier; and

(b) generating at least one micro-channel in the area of the skin of the subject, thereby facilitating the intradermal or transdermal delivery of the oligonucleotide or polynucleotide.

17. The method according to claim 16, wherein the oligonucleotide or polynucleotide is selected from the group consisting of oligonucleotides or polynucleotides of DNA, RNA, and synthetic analogs thereof.

18. The method according to claim 17, wherein the oligonucleotide or polynucleotide encodes a polypeptide, an analog, fragment, or fusion protein thereof.

19. The method according to claim 17, wherein the oligonucleotide or polynucleotide is operably linked to regulatory sequences, thereby capable of being expressed in cells of the subject.

20. The method according to claim 18, wherein the polypeptide is selected from the group consisting of insulin, proinsulin, follicle stimulating hormone, insulin like growth factor-1, insulin like growth factor-2, platelet derived growth factor, epidermal growth factor, fibroblast growth factors, nerve growth factor, colony stimulating factors, transforming growth factors, tumor necrosis factor, calcitonin, parathyroid hormone, growth hormone, bone morphogenic protein, erythropoietin, hemopoietic growth factors, luteinizing hormone, glucagon, glucagon like peptide-

1, clotting factors, anti-clotting factors, atrial natriuretic factor, plasminogen activators, bombesin, thrombin, enkephalinase, vascular endothelial growth factor, anti-angiogenic factors, interleukins, viral antigens, non-viral antigens, transport proteins, and antibodies.

21. The method according to claim 17, wherein the oligonucleotide is selected from the group consisting of antisense oligonucleotides, small interfering oligonucleotides (siRNAs), and miRNAs.

22. The method according to claim 16, wherein the pharmaceutical composition further comprising at least one additive selected from the group consisting of lipids, polycations, and nuclease inhibitors.

23. The method according to claim 16, wherein generating the at least one micro-channel in the area of the skin of the subject is conducted with an apparatus comprising:

(a) an electrode cartridge comprising a plurality of electrodes; and

(b) a main unit comprising a control unit which is adapted to apply electrical energy between two or more electrodes when the electrodes are in vicinity of the skin, typically generating current flow or one or more sparks, enabling ablation of stratum corneum in an area beneath said electrodes, thereby generating at least one micro-channel.

24. The method according to claim 23, wherein the electrode cartridge is adapted to generate a plurality of micro-channels of uniform shape and dimensions.

25. The method according to claim 23, wherein the electrodes have a diameter in a range of 30 to 150 microns.

26. The method according to claim 25, wherein the electrodes have a diameter in a range of 40 to 100 microns.

27. The method according to claim 23, wherein the electrodes have a length in a range of 30 to 500 microns.

28. The method according to claim 27, wherein the electrodes have a length in a range of 50 to 100 microns.

29. The method according to claim 23, wherein the electrical energy is of radio frequency.

30. A system for intradermal or transdermal delivery of an oligonucleotide or polynucleotide comprising: an apparatus for facilitating intradermal or transdermal delivery of an oligonucleotide or polynucleotide through skin of a subject, and a pharmaceutical composition comprising an oligonucleotide or polynucleotide, the apparatus comprising:

(a) an electrode cartridge comprising a plurality of electrodes; and

(b) a main unit comprising a control unit which is adapted to apply electrical energy between two or more electrodes when the electrodes are in vicinity of the skin, typically generating current flow or one or more sparks, enabling ablation of stratum corneum in an area beneath said electrodes, thereby generating at least one micro-channel.

31. The system according to claim 30, wherein the electrode cartridge is adapted to generate a plurality of micro-channels of uniform shape and dimensions.

32. The system according to claim 30, wherein the electrodes have a diameter in a range of 30 to 150 microns.

33. The system according to claim 32, wherein the electrodes have a diameter in a range of 40 to 100 microns.

34. The system according to claim 30, wherein the electrodes have a length in a range of 30 to 500 microns.

35. The system according to claim 34, wherein the electrodes have a length in a range of 50 to 100 microns.

36. The system according to claim 30, wherein the electrical energy is of radio frequency.